Utilizing global-best harmony search to train a PID-like ANFIS controller

ABSTRACT

This paper presents a PID-like adaptive neuro-fuzzy inference system (ANFIS) controller that can be trained by the global-best harmony search (GHS) technique to control nonlinear systems. Instead of the hybrid learning methods that are widely used in the literature to train the ANFIS structure, the GHS technique alone is used to train the ANFIS as a feedback controller, and hence, the necessity for the teaching signal required by other techniques has been eliminated. Moreover, the input and output scaling factors for this controller are also determined by the GHS. To show the effectiveness of this controller and its learning method, two nonlinear plants, including the continuous stirred tank reactor (CSTR), were used to test its performance in terms of generalization ability and reference tracking. In addition, this controller robustness to output disturbances has been also tested and the results clearly indicate the remarkable performance of this controller.

Keyword: ANFIS; CSTR; Global-best harmony search; Harmony search